The Mysore Coffee Experiment Station—Bulletin No. 1.

DEPARTMENT OF AGRICULTURE
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THE MYSORE COFFEE EXPERIMENT STATION

WHAT IT IS DOING FOR THE IMPROVEMENT OF MYSORE COFFEE

BY

DR. LESLIE C. COLEMAN, M.A., Ph.D.
Director of Agriculture in Mysore

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The Mysore Coffee Experiment Station.

What it is doing for the Improvement of Mysore Coffee. *

By Leslie C. Coleman, M.A., Ph.D.,
Director of Agriculture in Mysore.

The Mysore Coffee Experiment Station is situated in the Adigebail village of Kadur District and is about five miles from Balehonnur. The Station is about two miles from the Balehonnur—Koppa Road and is connected with it by a good station road which is passable in all seasons of the year. The station comprises 282 acres of land of which 82 acres are growing coffee 15—20 years old, 185 acres are jungle fit for growing coffee and 15 acres are waste land which have been utilized as a site for the buildings of the station. About 20 acres of the jungle have been cleared and planted with coffee during the past three years. The accompanying plan (Figure 1) shows the general plan of the station.

The station was opened in the year 1925 but progress was somewhat slow during the first two years. During the past three years there has been very marked progress along all lines and it seems certain that the station will become of steadily increasing value to Mysore coffee planters.

Buildings.

The accompanying plan (Fig. 2) shows the situation of the station buildings. These have been placed on a hill where the health conditions for staff and labour are particularly good for the Malnad.

The accompanying illustrations, Figures 3, 4 and 5, show some of the buildings on the station. Fig. 3 shows the laboratory building which has been specially designed and equipped for work on the improvement of coffee through selection and hybridization and for the study of the very serious diseases which attack coffee in Mysore. Fig. 4 shows some of the quarters constructed for the

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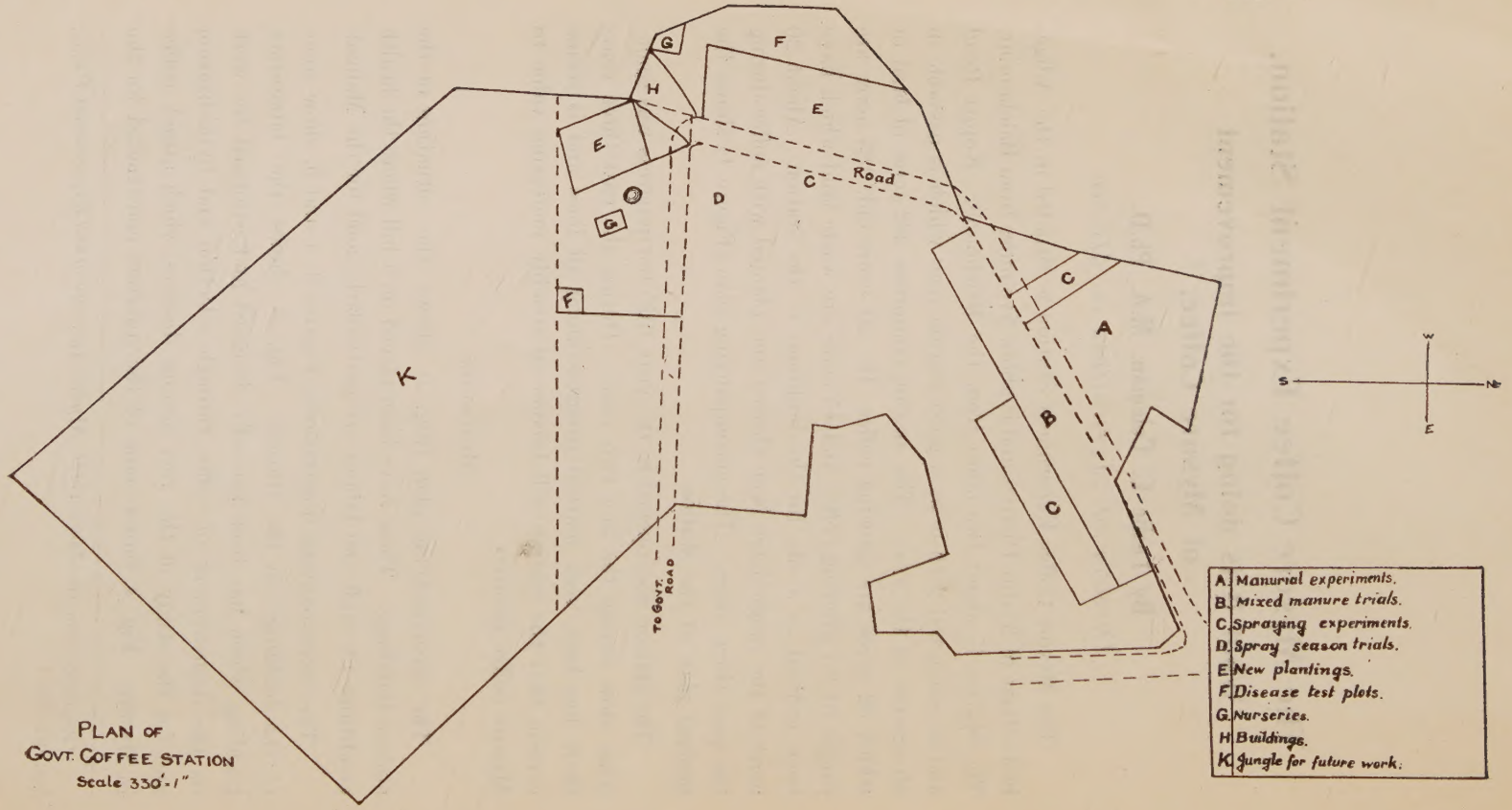
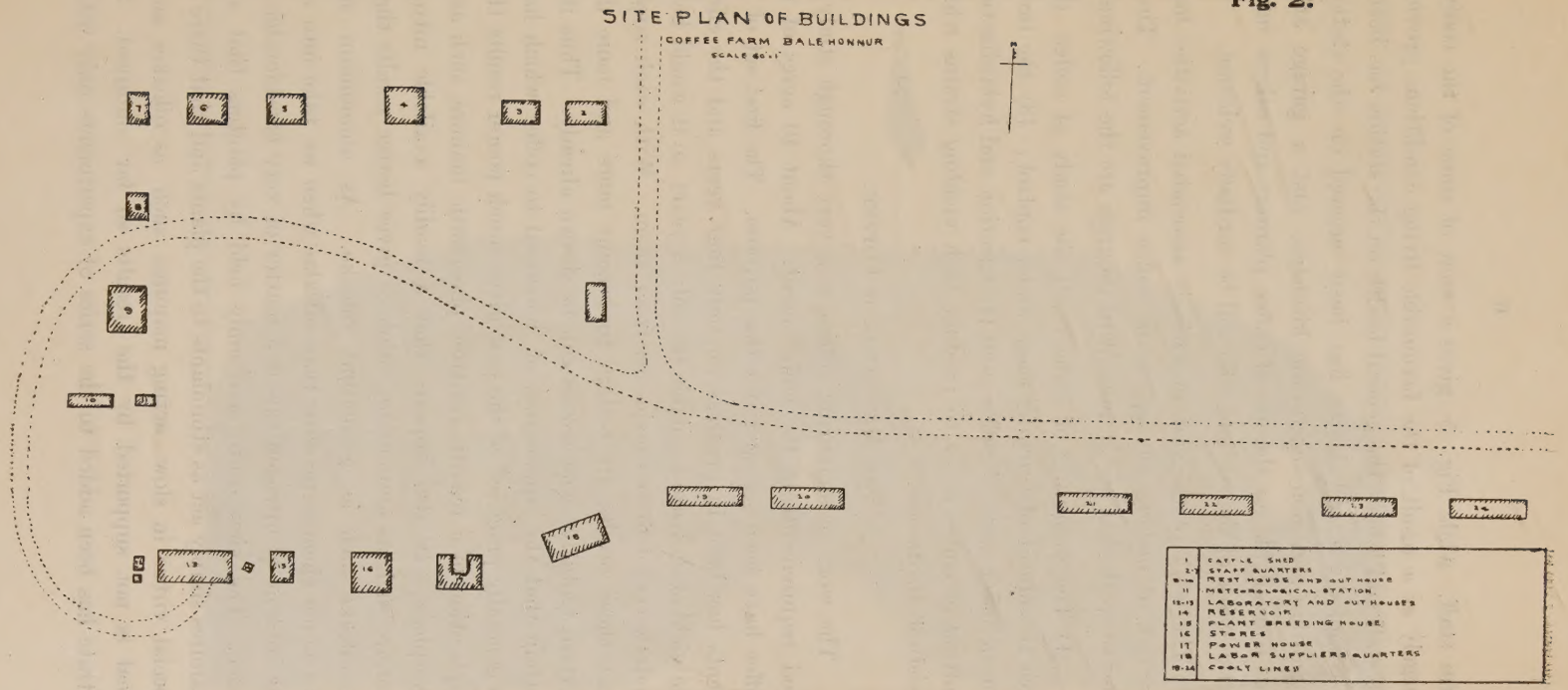
Fig. 1.



PLAN OF
GOVT. COFFEE STATION
Scale 330'-1"

Fig. 2.


SITE PLAN OF BUILDINGS
COFFEE FARM BALEHONNUR
SCALE 60 = 1"
1 CATTLE SHED
2-3 STAFF QUARTERS
5-6 MESS HOUSE AND OUT HOUSE
11 METEOROLOGICAL STATION
12-13 LABORATORY AND OUT HOUSES
14 RESERVOIR
15 PLANT BREEDING HOUSE
16 STORES
17 POWER HOUSE
18 LABOR SUPPLIERS QUARTERS
19-24 COOLY LINES

farm staff, while Fig. 5 gives a view of some of the cooly lines. Largely as a result of the favourable living conditions provided for the staff and labour the general health on the station has been good. A commodious rest house has been erected on the station with vegetarian and non-vegetarian kitchens, and a garage attached. This is available for the use of coffee planters and others interested in the work of the station, who will be cordially welcome.

The work of the station with its associated activities has been planned to include all aspects of coffee improvement. The main lines of work that are at present in progress are the following :—

(1) The manuring of coffee ; (2) the study of coffee diseases with the object of bringing them under control ; (3) the investigation of insect pests of coffee ; and (4) selection and hybridization and grafting of coffee so as to produce high yielding strains which are resistant to disease.

The Manuring of Coffee.

The work on manuring embraces a very thorough study of the food requirements of the coffee plant. About 40 acres of mature coffee have been set apart for this purpose. The first set of experiments has been in progress for only four years and the effects on the yield of crop are available for only 3 years, so it would be unsafe to draw very definite conclusions from them. With each succeeding year these results are certain to become more and more definite. Certain tentative conclusions can be drawn already. Thus it seems certain that the application of bonemeal to coffee which has been so generally practised in the past gives much poorer results than the application of a readily available phosphatic manure, such as superphosphate. It also appears that a readily available nitrogenous manure such as ammonium sulphate gives better results than does an oilcake such as groundnut oilcake. As ammonium sulphate is a much cheaper manure than oilcake when we take into account the content of nitrogen this is a matter of very considerable importance. The view quite commonly held by planters that artificial manures simply act as stimulants to the plants and that there is some special virtue in slow acting manures such as oilcakes and bone meal is not supported by the results so far obtained. Sodium nitrate has been added to the series of experiments only within the

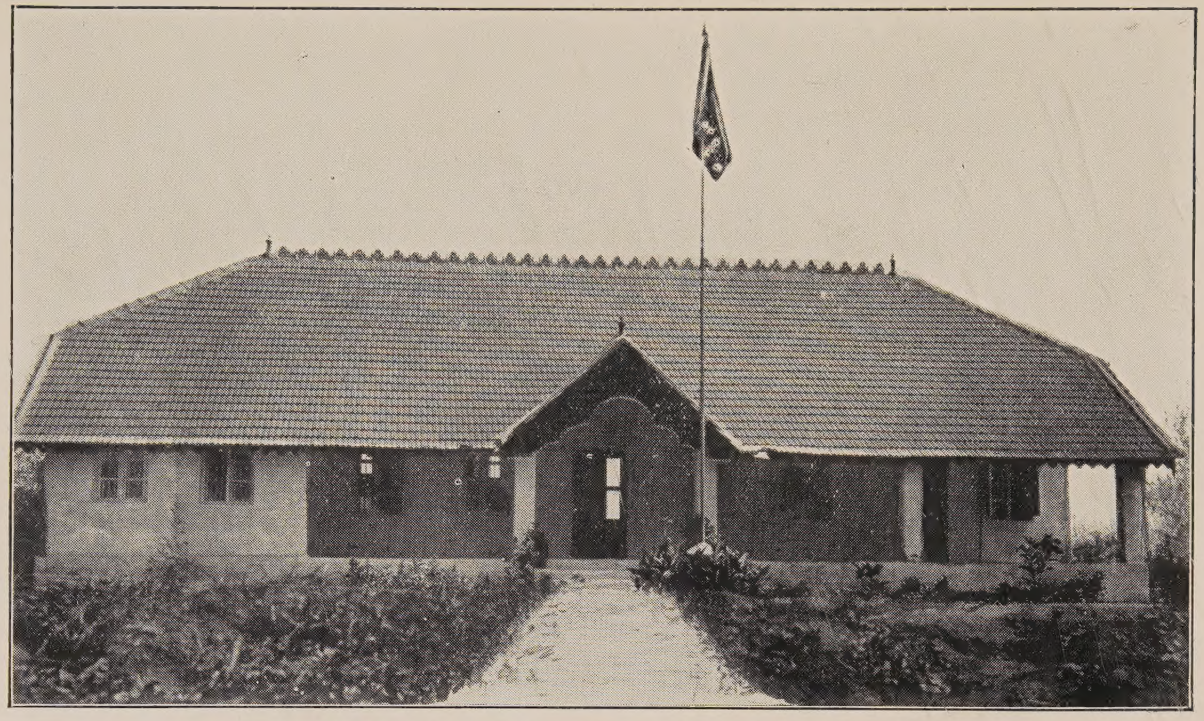


Fig. 3—Coffee Experiment Station—Research Laboratory.

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Fig. 4—View of the Staff Quarters.

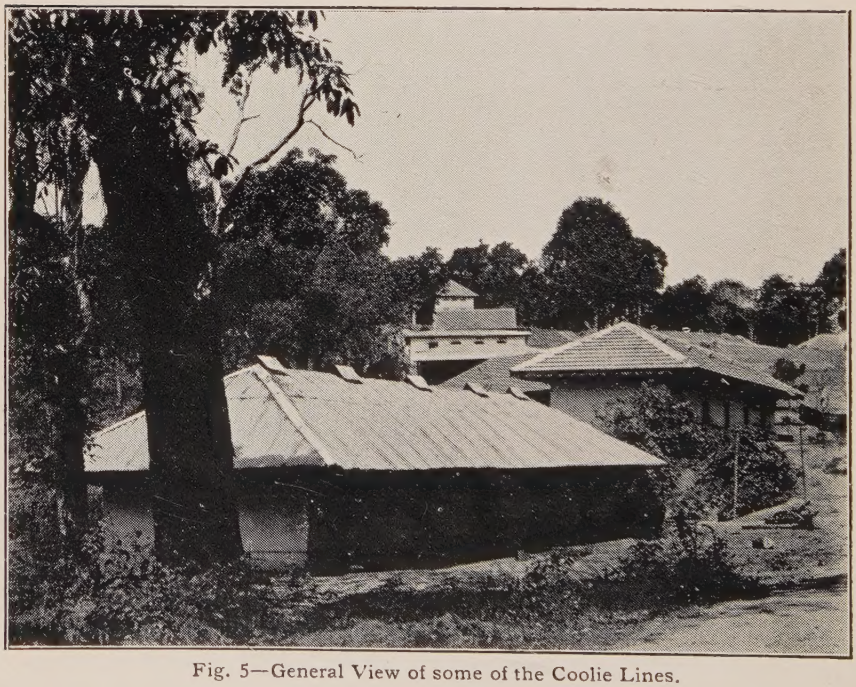

Fig. 5—General View of some of the Coolie Lines.

last two years ; so it is not possible to make any statement as regards its relative value.

Experiments with combined fertilizers such as Ammophos and Monammonphos have just been commenced. It is, I think, quite safe to say that within another two or three years we shall be able to give coffee-planters definite advice on manuring which will enable them to obtain better results with a reduced expenditure of money.

Plant Diseases.

The study of plant diseases has, as its object, the economic control of the disease but a necessary first step must be the study of the cause of the disease and the conditions which favour its appearance and spread. We are being greatly helped in this work by the presence of Mr. W. W. Mayne who is employed by the United Planters' Association of Southern India to work under the direction of the Director of Agriculture on the Station. Mr. Mayne is devoting the whole of his time to a study of such important diseases as leaf disease, die back and root rot. Black rot, one of the most serious diseases of coffee, has already been thoroughly investigated by the Agricultural Department and it has been shown conclusively that this disease can be completely controlled by spraying with Bordeaux mixture during the two months directly preceding the south-west monsoon. The study of 'die back' has shown with a fair degree of certainty that this disease can also be controlled by spraying. Leaf disease can be controlled by the same means. In the case of die back and leaf disease it appears likely that two sprayings a year—one in April or May and the other in September or October—will be necessary to give thorough control.

The effect of spraying is very marked. Planters who have been carrying out spraying operations on a fairly large scale state that it has increased their crop by an average of two hundredweights of coffee per acre while the spraying has cost in most cases less than the value of half a hundredweight of coffee. Even at the present somewhat reduced prices this represents an increase in the net return from coffee of nearly Rs. 100 per acre which, if it were spread over the whole coffee area in Mysore, would bring an increase in crop value of one crore of rupees per annum.

It will, no doubt, take some time before the practice of spraying will spread to all the coffee grown in the State but the rapidity with which it has been taken up by coffee planters, both Indian and European, during the past two or three years has been quite remarkable. Three years ago there could not have been more than 500 acres of coffee sprayed in the State. During the present year the area has arisen to more than 5,000 acres which must have led to an increase in the value of the crop by at least Rs. 4 lakhs. About 40 planters are known to have taken up spraying during the past year while the number is probably considerably more than this. Of these over twenty are Indian planters. A total of 240 small sprayers have been sold while three motor sprayers have been procured and supplied to one of the most important Indian planters. The accompanying Figs. 6 and 7 give two views in a coffee estate which has been very thoroughly sprayed and where high yields have resulted (an average of $6\frac{1}{2}$ cwts. per acre over 400 acres).

Fig. 6 gives a general view to show that while the coffee is bearing a heavy crop it has retained its leaf to a remarkable extent. Fig. 7 gives a close view of coffee trees bearing a very heavy crop and at the same time retaining a large number of leaves so much so that the crop is hardly visible in the picture.

The Agricultural Department is paying great attention to providing facilities for spraying to Indian planters and more especially to planters who own small areas. To enable these planters to obtain material and sprayers readily, depots have been opened at Tarikere, Chickmagalur and Saklespur. Government have also sanctioned a scheme where coffee planters can purchase sprayers and spraying materials on credit, the amount to be collected at the end of the following crop season. The appointment of Dr. M. K. Venkata Rao as Deputy Director of Agriculture for the planting areas will enable a much more thorough organization of spraying demonstrations than has been possible heretofore and I anticipate a very rapid expansion in the area sprayed in the immediate future.

The work on the station in connection with spraying is twofold. In the first place various different kinds and strengths of spray mixtures are being tested with the object of ascertaining which mixture combines to the greatest extent efficiency with cheapness.

Fig. 6—General View of a portion of a Coffee Estate thoroughly sprayed.

Fig. 7—Close View of Sprayed Coffee Bushes.
Note the heavy crop and the large number of leaves retained.

Fig. 8 Charging a Battery Sprayer (Holder Fix No. 1) with the mixture contained in the barrel

Fig. 9—Spraying with a Battery Sprayer.

In the second place various different types of sprayers are being tested with reference to their efficiency and suitability for large and small estates. Figs. 8—11 show different types of sprayers in use for spraying coffee. Fig. 8 shows a battery sprayer being charged with spray mixture. Fig. 9 shows the same sprayer in use on coffee. Fig. 10 shows a Drake & Fletcher Headland sprayer in action. Fig. 11 shows a Holder motor sprayer which is being tested for its suitability for coffee spraying. An attempt is being made to induce important manufacturers of sprayers and spraying machinery to send samples of their manufactures to the station for testing. If we are successful in this we should, within the next two or three years, be able to advise coffee planters as to the most suitable types of sprayers for their particular conditions.*

As already stated, it has been established that the three serious coffee diseases can be effectively controlled by spraying. The control of root rot is a more difficult question. The root rots of coffee are at present being studied by Mr. Mayne and it seems just possible that spraying may have an indirect effect in bringing them under control. However a more promising line of attack is the production of varieties with a resistant root system. It is generally recognized that both Robusta and Liberica coffee are much more resistant to root rots than the Arabica types generally grown in Mysore. It seems probable therefore that hybrids of Arabica with one or both of these other species of coffee can be produced which will be highly resistant to root rots. The production of such hybrids will take time and in the meantime another promising method of control is being attempted. This method is to graft Arabica coffee on to root stocks of Robusta and Liberica. Experiments in this connection have been in progress on the station for the past two years. The experiments have been planned to ascertain the best season for grafting, the most suitable age of material to use and the grafting method to be followed which, while remaining simple so that it can be taught to an ordinary cooly, will, at the same time, give the largest number of successful grafts. Very promising results have been obtained during the present year and it seems probable that a method

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* A bulletin on the "Spraying of Coffee" is under preparation and will be published shortly.

will be worked out which will enable a gang of two men (one grafter and one helper) to make about 100 successful grafts per day. As the favourable grafting season extends probably over a season of about three months, two men should be able to produce material in one season sufficient for the planting of 5 acres. Figs. 12 and 13 show the grafting work in progress in the station nursery. The glass tubes are inverted over the plants after the grafting is done to prevent drying out. The use of these tubes has greatly increased the success of grafting work.

Grafting of coffee will serve another valuable purpose in addition to providing plants resistant to root rot. It will enable coffee planters to propagate from trees in their estates which consistently give the highest yields. This will give them plants both for supplies and for new plantings which are certain to yield well, something which cannot be assured in the case of plants raised from seed.

Insect Pests.

If we turn to a consideration of the insect pests that attack coffee there are two of serious importance. These are coffee green bug (*Coccus viridis*) and coffee-borer (*Xylotrechus quadripes*). The Department has already worked out an effective method of control for the first of these. This is spraying with fish oil resin soap which was first introduced by the Entomological Section of the Department in the year 1914 and which has been the standard method of control ever since. As regards coffee-borer not so much progress has been made. However, the collection of the beetles as they emerge, which has been advised by our Entomological Section, undoubtedly tends to bring this serious pest under control. Scrubbing of the stems to prevent the laying of eggs which has been recommended by the Entomological Section is being followed by a number of planters. Some promising methods of stem treatment to prevent the laying of eggs are under investigation. The possibility of destroying the eggs and the young larvæ soon after hatching by a spray or wash applied to the stems is also being studied. It is known that the adult beetle of the coffee-borer prefers exposed and unshaded areas for laying eggs and it seems quite probable that spraying, which enables the coffee bushes to retain their leaves, will serve as a means of controlling coffee-borer also.

Fig. 10—Drake and Fletcher Headland Sprayer in action

Fig. 11—Motor Sprayer (Holder), with four long hose attachment.

Fig. 12—Grafting of Young Coffee Plants in the Nursery.
Inverted glass tubes protect grafts from drying.

Fig. 13—Grafted Coffee Plants four months old.

Plant Breeding.

The improvement of Mysore coffee by selection and hybridization forms one of the most important items of work of the coffee experiment station. A necessary first step has been the collection of seed from high yielding trees of Arabica coffee from as many different estates and areas as possible. These have to be grown in plots side by side to enable us to study their growth, resistance to disease and production of crop. In addition, seed of as many different species and varieties of coffee as can be obtained has been collected and plants are being raised from this seed. We have at present on the station material from almost 200 selected plants collected in most of the coffee-growing areas of South India. In addition we have material of most of the coffee species which are being grown commercially in various parts of the world.

By the end of the present calendar year we shall have about 15,000 trees or approximately ten acres planted with seed from what must be looked upon as about the best individual coffee trees which are growing in South India. From this huge mass of material it seems certain that we shall be able to make selections of outstanding merit. The seed from a few of the oldest of these plants are being procured by self-fertilization this year while other flowers on the same plants have been cross-fertilized with selected Robusta plants.

As one of the main objects of our breeding work is to procure new strains which are resistant to disease, no spraying is being done on the breeding area. Selections will be made from those plants which promise regular high yield and which at the same time show the least attack of such diseases as 'die back' and 'leaf disease'. Our selections will be still more severely tested by growing them under conditions such as to favour the development of the various important coffee diseases.

As already stated, our first selections have just been made and from now on we should each year have an increasing number of plants from which to make selections. I anticipate that within ten years' time we should have reached a stage when we shall be able to start distributing seed for trial to coffee planters. Every effort will be made to speed up this work but it is work which, in the nature of things, requires time. That the results of this work will be of very great value to coffee planters seems to me quite certain.

Demonstration work in connection with the results obtained on the Coffee Experiment Station.

A very considerable amount of demonstration work has been carried out during the past two years in connection with spraying for the control of coffee diseases. A certain amount of demonstration work on the control of coffee-borer has also been conducted. The services of the Agricultural Chemist have also been requisitioned by a number of planters in connection with the manuring of coffee. In connection with work on different varieties and species of coffee it is important to mention that trials of Robusta and Arabica coffee have been started on the Marthur Farm in Shimoga District. The growth of Robusta plants has been distinctly promising. If we succeed in our trials with this coffee, as I believe we shall, it will open up possibilities of developing a very large Malnad area which at present is practically dependent upon arecanut and paddy for its agricultural production.

It is fully realized that unless the results of our experimental work can be carried to the coffee estates, large and small, of Kadur and Hassan Districts the station cannot be said to have justified its existence. As I have already pointed out, the spraying on coffee estates which has been very largely due to the efforts of the Department is already leading to an increase in crop valued at about Rs. 5 lakhs per annum. The advice on manuring based largely on results obtained on the station is also benefiting coffee planters. However it has been felt that much more intensive efforts are required in connection with our demonstration work. With the object of organizing and intensifying this work throughout our whole coffee area Government have recently established a separate circle consisting of the taluks of Kadur and Hassan districts where coffee planting is extensively carried on. Dr. M. K. Venkata Rao, who has heretofore been in charge of the Coffee Station, has been placed in charge of this Circle with headquarters at Chickmagalur. To ensure efficiency on the station itself there has been recently appointed as Manager, Mr. K. H. Sreenivasan, a graduate of Edinburgh University, who has had several years' experience in the management of a group of coffee estates. Dr. Venkata Rao will have under his charge at once a staff of 4 agricultural inspectors and 8 fieldmen and I trust that this

staff will be considerably strengthened in the near future. Each of the inspectors is in charge of a depot where sprayers and spraying materials will be stocked for the benefit of the smaller planters who are not in a position to order large quantities direct from main suppliers. This staff will be used very much more intensively for the benefit of coffee planters than it has been in the past and I anticipate as a result that there will be a very rapid adoption of the methods of manuring and of disease control recommended by the Department as a result of investigations carried out by the Department. It is our intention to enable every coffee planter in Mysore, large or small, to make use of the information and results which are being so carefully collected by intensive scientific work on the Mysore Coffee Experiment Station.